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Institute for Materials Science Distinguished Lecture Series

Spontaneous Symmetry Breaking, Chirality, and Lev Landau and his Nobel Prize

Date: Tuesday, January 19, 2016
Time: 2pm – 3pm
Location: MSL Auditorium (TA-03 - Bldg 1698 - Room A103)

Hosted By Alexander Balatsky

Abstract

The concept of spontaneous symmetry breaking has served physics well for almost a century, with ferromagnetism, superfluidity, and superconductivity in condensed matter later providing inspiration to particle physics and the origin of the BEH-mechanism. In chemistry, the Jahn-Teller theorem in 1937 predicted spontaneous symmetry breaking and lifting of degeneracy in degenerate electronic states of nonlinear molecules, later verified experimentally by spectroscopy. The acknowledgment to Lev Landau in the original 1937 paper suggests a possible link to the Ginzburg-Landau paper of 1950.

The other, and older, example of spontaneous symmetry breaking in chemistry, the broken symmetry of bioorganic objects, was noticed already by Louis Pasteur, and led him to conclude that the molecules of life are not only chiral but also asymmetric. We live in a homochiral world, but we do not know why.

The talk will consist of two parts. The first part is a brief review of molecular chirality and a description of the experimental efforts we have done in Stockholm to try to reach an understanding of chirality and chiral recognition. In the second part of the talk, Professor Larsson will describe the nominations and considerations leading up to the 1962 Nobel Prize in Physics, which was awarded to Lev Landau.

Bio: Mats Larsson is a professor of physics at Stockholm University and serves as Director of AlbaNova University Center that, among other things, hosts the Nordic Institute of Theoretical Physics (Nordita). His present research interests concern chiral molecules and free electron lasers. Professor Larsson organized a Nobel Symposium on Free Electron Laser Research, which took place in 2015.

Professor Mats Larsson is Member Elect of the Royal Swedish Academy of Sciences and the Nobel Committee for Physics.